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BZOHAR SIMULATIONS OF PONDEROMOTIVELY DRIVEN ION WAVES *

B. I. Cohen, A. B. Langdon, B. F. Lasinski, and E. A. Williams

Lawrence Livermore National Laboratory
Livermore, California 94550.

Two-dimensional electrostatic BZOHAR simulations of ponderomotively driven ion acoustic waves (IAWs) are used to study ion wave nonlinearities that can be relevant to stimulated Brillouin scattering (SBS). The simulations use kinetic ions and Boltzmann fluid electrons, and retain charge separation effects. The simulations use parameters relevant to recent SBS experiments and to conditions expected in NIF.

Simulation examples show the parametric decay of a driven IAW into half-harmonic IAWs with a small finite wavenumber perpendicular to the primary IAW propagation in qualitative agreement with a fluid analysis.[1] Thresholds are observed that are in semi-quantitative agreement with simple theory. The resonant excitation (seeding) of secondary IAWs at the half-harmonic of the primary and with small values of the perpendicular wavenumber accelerates the parametric decay of the primary IAW, while seeding at longer or shorter wavelengths has little effect on the primary wave decay.

Motivated by the SBS experiments with two pump lasers performed by Baldis, Labaune, *et al.*,[2] we have simulated the seeding of a primary driven IAW with a smaller amplitude IAW at nearly the same frequency and wavenumber, and with a small relative propagation angle ($\sim 20°$). We observed the coupling of the seed IAWs with the primary to produce other IAWs and depletion of the primary. The depletion increased with increasing amplitudes of the driven primary and seed IAWs. The simulation results agreed qualitatively with the experimental observations.

In simulations with a laterally localized driven IAW, e.g., a "speckle," and a uniform transverse plasma flow with velocity $\leq c_s$, the effective dissipation seen by the IAW was increased. The transverse flow reduced the resonant response amplitude, and the reduction increased with increasing flow speed $\leq c_s$.

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[1] B. I. Cohen, B. F. Lasinski, A. B. Langdon, and E. A. Williams, UCRL-JC-124922 (July 1996), submitted to the Physics of Plasmas.

[2] H. Baldis, C. Labaune, *et al.*, Phys. Rev. Lett. **77**, 2957 (1996).